

Emerging Commercial UAS Operating Environments (OE)

IFR-LIKE

UAS will be expected to meet certification standards and operate safely with traditional air traffic and ATM services. (Example Use Case: Communication Relay / Cargo Transport)

FL-600

18K'
MSL

Non-cooperative
Traffic

Cooperative
Traffic

Cooperative
Traffic

10K'
MSL

VFR-LIKE

These UAS will operate at altitudes below critical NAS infrastructure and will need to routinely integrate with both cooperative and non-cooperative aircraft. (Example Use Case: Infrastructure Surveillance)

Non-Cooperative
Traffic

Cooperative
Traffic

Top of
Class G

BVLOS RURAL

Low risk BVLOS rural operations with or without aviation services. (Example Use Case: Agriculture)

Non-Cooperative
Aircraft

BVLOS URBAN

Must interface with dense controlled air traffic environments as well as operate safely amongst the traffic in uncontrolled airspace. (Example Use Case: Traffic Monitoring / Package Delivery)

Terminal
Airspace

Airport

Agricultural
Aircraft

Helicopters

VLOS

VLOS

Restricted Access

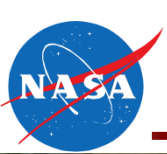
TIME (Notional)

Routine Access

RURAL

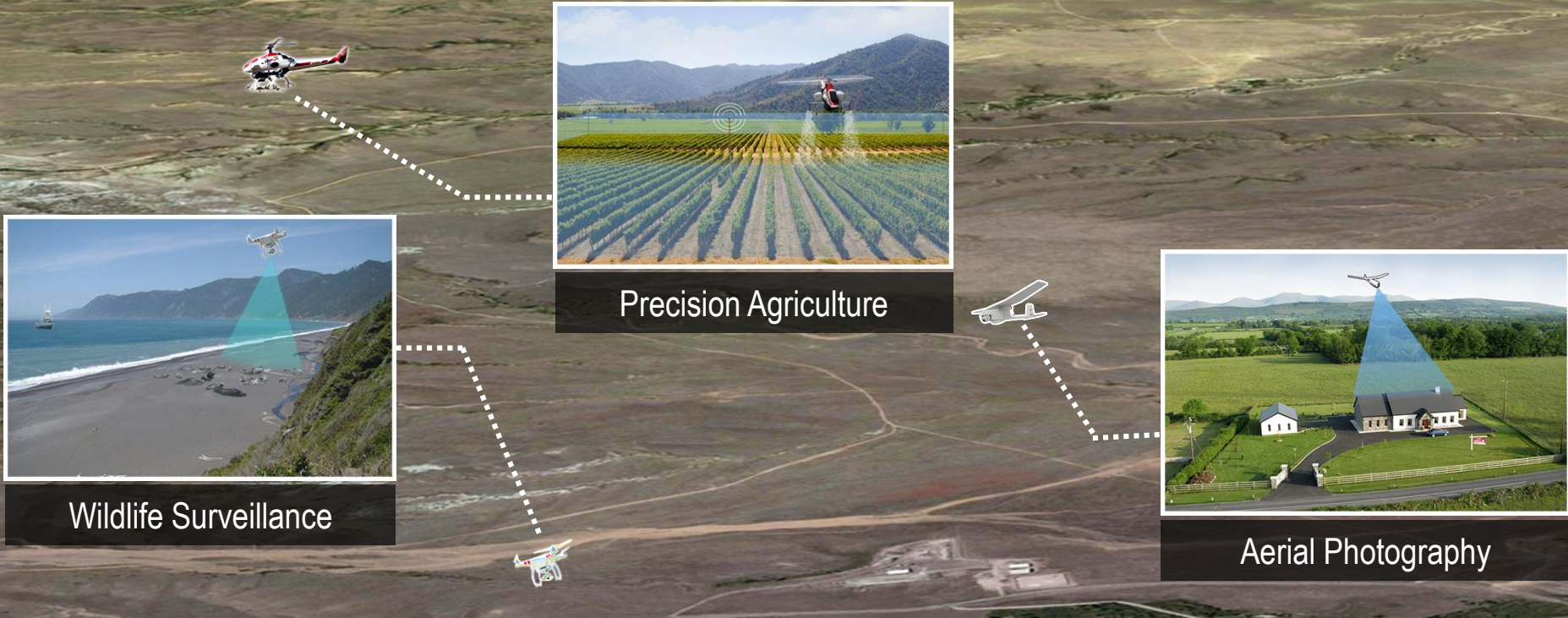
1

URBAN



UAS Demand

Low Altitude Rural Operations

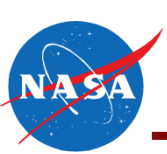


Demand Drivers:

- There is a significant demand for visual line of sight flights to conduct precision agriculture, photography, and surveillance missions. This has been evident through the FAA's incremental approval process from COAs to Section 333 to 14CFR Part 107.
- The demand for these missions to expand the approval envelope to include operations beyond visual line of sight has been increasing.

Representative Markets / Companies:

- Precision Agriculture (PrecisionHawk, Elbit)
- Wildlife Surveillance (NWF, Fish & Game)
- Aerial Photography (GoPro, Roofing, Real Estate)
- Remote Surveillance (Pipelines, Railroads, Power lines, Mining)
- Vertical Infrastructure (Oil /Gas refineries, Bridges)



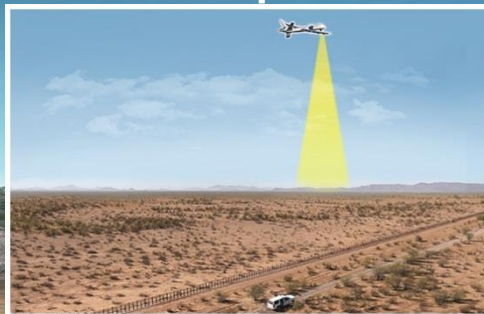
UAS Demand

IFR-Like Operations

60K'
MSL

18K'
MSL

10K'
MSL



Broad Area Surveillance



Cargo & Passenger Transport



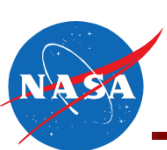
Communications Relay

Demand Drivers:

- Beyond DoD, many organizations (e.g. DOI, NOAA, NASA, FedEx, DHL) have expressed an interest in using IFR-Like operations for surveillance, science, and cargo delivery missions.
- Industry is also very interested in using HALE UAS as a more reliable option to satellite communications for remote parts of the globe.

Representative Markets / Companies:

- Communications Relay (Facebook, Google, AeroVironment)
- Cargo & Passenger Transport (FedEx, DHL, Medical Supply, Thin Haul)
- Broad Area Surveillance (DOI, DHS)
- Weather Monitoring (NOAA, NASA)
- Emergency Response & Assessment (Land Management, FEMA, Insurance)

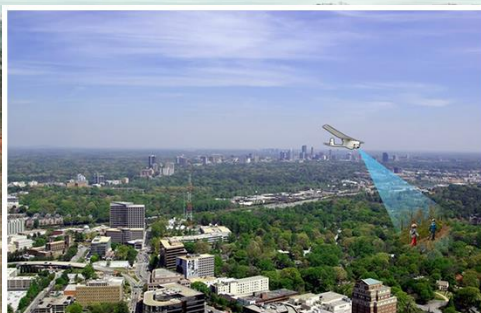


UAS Demand

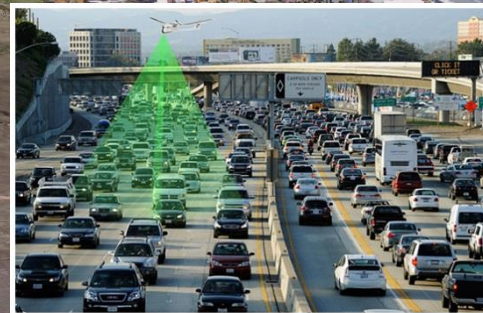
Low Altitude Urban Operations



Local Package Delivery



Search and Rescue



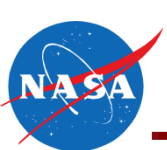
Traffic Monitoring

Demand Drivers:

- The most prominent example of UAS demand has been in the package delivery trade space. Amazon, Google, Walmart, and others have plans to use the low altitude volume of airspace for on-demand, door-to-door delivery of goods.
- Several public service applications exist such as news gathering, traffic monitoring and photogrammetry.

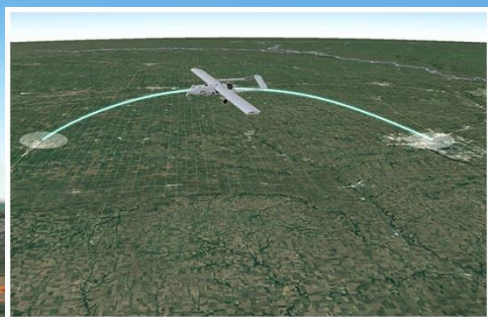
Representative Markets / Companies:

- Local Package Delivery (Amazon, Walmart)
- Traffic Monitoring (Local News Stations, Waze)
- Search and Rescue (Law Enforcement, First Responders)
- Infrastructure Surveillance & Protection (Airports, Stadiums, Prisons, DHS CBP)
- Construction Site Monitoring (Land developers, Tax Assessment)

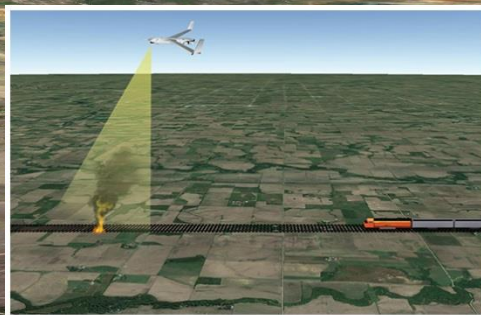


UAS Demand

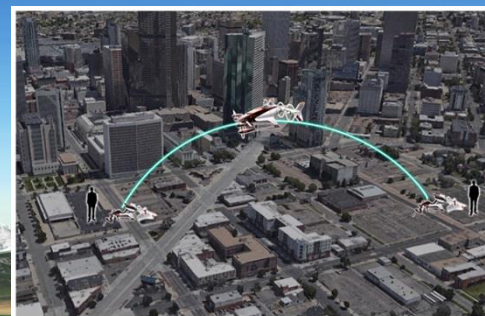
VFR-Like Operations



Regional Cargo Delivery



Horizontal Infrastructure



Passenger Transport



Demand Drivers:

- Demand for VFR-Like UAS will largely depend on their ability to establish a business case that is competitive with many existing manned aircraft operations.
- Beyond Visual Line of Site (BVLOS) operations for horizontal infrastructure inspection, regional package delivery and transportation of people are current markets for this class of vehicle.

Representative Markets / Companies:

- Horizontal Infrastructure (Railways, Exxon Mobil, Duke Energy)
- Regional Cargo Delivery (Amazon, Walmart)
- Personal Transportation (Uber, AIRBUS, Ehang)
- Humanitarian Studies (Red Cross, Health Dept.)
- Wildfire Monitoring (Fire Rescue, State/Local Authorities)

Market: Large UAS & HALE

HALE UAS

Upper E
Airspace

